CLAIMS

~~1. An exhaust gas catalyst system, comprising:~~

~~a substrate; and~~

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~~a nitrogen oxide adsorber disposed on said substrate, the nitrogen oxides adsorber comprising:~~

~~a porous support;~~

~~at least one alkali metal barrier; and~~

~~a material loaded on said porous support comprising:~~

~~a NO_x oxidation catalyst; and~~

~~at least one alkali material.~~

2. The exhaust gas catalyst system of Claim 1, wherein said porous support comprises alumina, gamma-alumina, delta-alumina, theta-alumina, zeolite, zirconia, ceria, magnesium oxide, titania, silica, or mixtures comprising at least one of the foregoing.

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3. The exhaust gas catalyst system of Claim 1, wherein said NO_x oxidation catalyst is platinum, palladium, rhodium, or mixtures comprising at least one of the foregoing.

4. The exhaust gas catalyst system of Claim 1, wherein the alkali material is sodium, potassium, cesium, lithium, rubidium, or mixtures comprising at least one of the foregoing.

5. The exhaust gas catalyst system of Claim 1, wherein the alkali metal barrier is a material containing an 112 early transition metal oxide.

6. The exhaust gas catalyst system of Claim 5, wherein the alkali metal barrier is a material selected from the group consisting of zirconia, titania, ferric oxide, cordierite, alpha-alumina, mullite, tin oxide, ceria, manganese oxide, silica, vanadium oxide, chromium oxide, hafnium oxide, molybdenum oxide, tungsten oxide, and mixtures comprising at least one of these materials.

7. The exhaust gas catalyst system of Claim 1, wherein the alkali metal barrier is present in an amount sufficient to substantially inhibit the migration of alkali material out of said nitrogen oxides adsorber.

8. The exhaust gas catalyst system of Claim 7, wherein the alkali metal barrier is loaded on said porous support and present in an amount of up to about 2 g/in^3.

9. The exhaust gas catalyst system of Claim 8, wherein the alkali metal barrier is present in an amount up to about 0.35 g/in^3.

10. The exhaust gas catalyst system of Claim 9, wherein the alkali metal barrier is present in an amount up to about 0.25 g/in^3.

11. The exhaust gas catalyst system of Claim 10, wherein the alkali metal barrier is present in an amount of about 0.05 g/in^3 to about 0.20 g/in^3.

12. The exhaust gas catalyst system of Claim 7, wherein the alkali metal barrier is a layer disposed between said substrate and said porous support.

13. The exhaust gas catalyst system of Claim 12, wherein said layer comprises an atomic film.

14. The exhaust gas catalyst system of Claim 12, wherein said layer has a thickness of up to about 100 μ.

15. The exhaust gas catalyst system of Claim 12, further comprising additional alkali metal barrier mixed with said material.

16. The exhaust gas catalyst system of Claim 1, further comprising a three-way catalyst component, positioned downstream of the nitrogen oxides adsorber or part of the nitrogen oxides adsorber.

17. A method of reducing alkali material migration from a nitrogen oxides adsorber washcoat to a cordierite substrate, comprising:

depositing an alkali metal barrier layer on a substrate; and

depositing on said alkali metal barrier layer, a nitrogen oxides adsorber composition comprising a NO_x oxidation catalyst and at least one alkali material loaded on a porous support.

18. The method of reducing alkali material migration of Claim 17, wherein said porous support comprises alumina, gamma-alumina, delta-alumina, theta-alumina, zeolite, zirconia, ceria, magnesium oxide, titania, silica, and mixtures comprising at least one of the foregoing porous supports.

19. The method of reducing alkali material migration of Claim 17, wherein said NO_x oxidation catalyst selected from the group consisting of platinum, palladium, rhodium, and mixtures comprising at least one of the foregoing catalysts.

20. The method of reducing alkali material migration of Claim 17, wherein the alkali material is selected from the group consisting of sodium, potassium, cesium, lithium, rubidium, and mixtures comprising at least one of the foregoing alkali materials

21. The method of reducing alkali material migration of Claim 20, wherein the alkali material is further combined with an alkaline earth material selected from the group consisting of barium, strontium, calcium, magnesium, and combinations comprising at least one of the foregoing alkaline earth materials.

22. The method of reducing alkali material migration of Claim 17, wherein the alkali metal barrier is a material containing an early transition metal oxide.

23. The method of reducing alkali material migration of Claim 22, wherein the alkali metal barrier is a material selected from the group consisting of zirconia, titania, ferric oxide, cordierite, alpha-alumina, mullite, tin oxide, ceria, manganese oxide, silica, vanadium oxide, chromium oxide, hafnium oxide, molybdenum oxide, tungsten oxide, and mixtures comprising at least one of these materials.

24. The method of reducing alkali material migration of Claim 17, wherein the alkali metal barrier is present in an amount sufficient to substantially inhibit the migration of alkali materials out of said nitrogen oxides adsorber.

25. The method of reducing alkali material migration of Claim 24, wherein the alkali metal barrier is present in an amount of up to about 2 g/in^3.

26. The method of reducing alkali material migration of Claim 25, wherein the alkali metal barrier is present in an amount up to about 0.35 g/in^3.

27. The method of reducing alkali material migration of Claim 26, wherein the alkali metal barrier is present in an amount up to about 0.25 g/in^3.

28. The method of reducing alkali material migration of Claim 27, wherein the alkali metal barrier is present in an amount of about 0.05 g/in^3 to about 0.20 g/in^3.

29. A method of reducing alkali material migration from a nitrogen oxides adsorber washcoat to a substrate, comprising:

depositing on a substrate, a nitrogen oxides adsorber composition comprising a material loaded on a porous support, the material comprising: a NO_x oxidation catalyst; at least one alkali material; and at least one alkali metal barrier.

30. The method of reducing alkali material migration of Claim 29, wherein said porous support comprises alumina, gamma-alumina, zeolite, zirconia, ceria, magnesium oxide, titania, silica, or mixtures thereof.

31. The method of reducing alkali material migration of Claim 30, wherein said NO_x oxidation catalyst is platinum, palladium, rhodium, or mixtures thereof.

32. The method of reducing alkali material migration of Claim 31, wherein the alkali material is sodium, potassium, cesium, rubidium, or mixtures thereof.

34. The method of reducing alkali material migration of claims 30, wherein the alkali metal barrier is a material containing an early transition metal oxide.

35. The method of reducing alkali material migration of claim 34, wherein the alkali metal barrier is a material containing zirconia (ZrO_2), titania (TiO_2), ferric oxide (Fe_2O_3), cordierite, mullite, tin oxide (SnO_2), zirconia rich oxide with ceria oxide, manganese oxide (MnO_2), silica (SiO_2), vanadium oxide (V_2O_5), chromium oxide (Cr_2O_3), hafnium oxide (HfO_2), molybdenum oxide (MoO_3), tungsten oxide (WO_3), or mixtures thereof, including alkali metal barriers supported on alumina.

36. The method of reducing alkali material migration of Claim 29, wherein the alkali metal barrier is present in an amount sufficient to substantially inhibit the migration of alkali materials out of said nitrogen oxides adsorber.

37. The method of reducing alkali material migration of Claim 36, wherein the alkali metal barrier is present in an amount up to about 0.25 g/in^3.

38. The method of reducing alkali material migration of Claim 37, wherein the alkali metal barrier is present in an amount of about 0.05 g/in^3 to about 0.20 g/in^3.